

Claims

[c1] A vehicle braking system having a wheel coupled to the vehicle, a brake coupled to the wheel, wherein the wheel includes a friction component for inhibiting rotation of the wheel, the brake having a first state wherein said friction component is positioned a first distance from said wheel, and a second state, wherein said friction component is positioned a second distance from said wheel closer than said first distance, the vehicle braking system comprising:

a proximity sensor coupled to the vehicle and sensing an object along a direction of travel of the vehicle and generating a proximity signal therefrom; and

a controller receiving said proximity signal and generating therefrom a threat of collision prediction signal, said controller moving the friction component from the first state to the second state as a function of a high threat of collision determined from the threat of collision prediction signal.

[c2] The system of claim 1 further comprising a vehicle speed sensor coupled to the vehicle and sensing a speed of the vehicle and generating a vehicle speed signal therefrom.

- [c3] The system of claim 1 further comprising a brake pressure sensor coupled to the vehicle and sensing a current brake pressure and generating a current brake pressure signal therefrom.
- [c4] The system of claim 3, wherein said controller receives said proximity signal, a vehicle speed signal, and said current brake pressure signal, and wherein said controller generates therefrom said threat of collision prediction signal.
- [c5] The system of claim 4, wherein said threat of collision prediction signal is a function of a closing velocity between the vehicle and said object above a threshold.
- [c6] The system of claim 1 further comprising a brake pedal coupled to the vehicle, wherein the friction component moves from the second position to the first position when the brake pedal has not been depressed a predetermined time after said threat of condition signal is generated.
- [c7] The system of claim 1, wherein said proximity sensor comprises a radar, lidar or vision based sensor.
- [c8] The system of claim 1 further comprising a warning signal coupled to the vehicle and activating in response to

said threat of collision signal.

- [c9] The system of claim 8, wherein said warning signal comprises a warning light, a warning chime, or a brake light.
- [c10] The system of claim 1, wherein the brake further comprises a third state, wherein said friction component is positioned a third distance from said wheel, said controller moving the friction component from the first state or the second state to said third state as a function of said high threat of collision determined from the threat of collision prediction signal and a signal indicating that a throttle pedal has been released.
- [c11] The system of claim 10, wherein said controller will inhibit the friction component moving from the first state or the second state to said third state only if a failure with throttle actuation cannot be determined.
- [c12] The system of claim 1, wherein movement of the friction component is halted through throttle pedal activation.
- [c13] The system of claim 1, wherein movement of the friction component is halted in response to the vehicle near a limit of handling point regardless of an estimated threat.
- [c14] The system of claim 1, wherein movement of the friction component is inhibited in response to failure of the vehicle

cle braking system, a vehicle speed sensor or a proximity sensor.

[c15] A vehicle braking system having a wheel coupled to the vehicle, a brake coupled to the wheel, wherein the wheel includes a friction component for inhibiting rotation of the wheel, the brake having a first state wherein said friction component is positioned a first distance from said wheel, and a second state, wherein said friction component is positioned a second distance from said wheel closer than said first distance, the vehicle braking system comprising:

- a proximity sensor coupled to the vehicle and sensing an object along a direction of travel of the vehicle and generating a proximity signal therefrom;
- a vehicle speed sensor coupled to the vehicle and sensing a speed of the vehicle and generating a vehicle speed signal therefrom;
- a brake pressure sensor coupled to the vehicle and sensing a current brake pressure and generating a current brake pressure signal therefrom; and
- a controller receiving said proximity signal, said vehicle speed signal, and said current brake pressure signal, said controller generating therefrom a threat of collision prediction signal as a function of an analysis of a closing velocity between the vehicle and said object above a

threshold and within a close proximity of the vehicle, said controller moving the friction component from the first state to the second state in response to a high threat of collision within said threat of collision prediction signal.

- [c16] The braking system of claim 15, wherein the brake further comprises a third state, wherein said friction component is positioned a third distance from said wheel, said controller moving the friction component from the first state or the second state to said third state as a function of said high threat of collision determined from the threat of collision prediction signal and a signal indicating that a throttle pedal has been released.
- [c17] The system of claim 16, wherein said controller will inhibit the friction component moving from the first state or the second state to said third state only if a failure with throttle actuation cannot be determined.
- [c18] The system of claim 16, wherein movement of the friction component is halted through throttle pedal activation.
- [c19] The system of claim 16, wherein movement of the friction component is halted in response to the vehicle near a limit of handling point regardless of an estimated

threat.

- [c20] The system of claim 16, wherein movement of the friction component is inhibited in response to failure of the vehicle braking system, a vehicle speed sensor or a proximity sensor.
- [c21] The braking system of claim 15 further comprising a brake pedal coupled to the vehicle, wherein said friction component moves from said second position to said first position when said brake pedal has not been depressed a predetermined time after said threat of condition signal is generated.
- [c22] The system of claim 15 further comprising a warning signal coupled to the vehicle and activating in response to said threat of collision signal, wherein said warning signal comprises a warning light, a warning chime, or a brake light.
- [c23] A method for pre-charging brakes for a vehicle, said method comprising:
 - sensing an object in a near vicinity of the vehicle;
 - generating a proximity signal;
 - predicting a threat of collision between said object and the vehicle in response to said proximity signal;
 - determining whether said threat of collision is high; and

pre-charging the brakes in response to a high threat of collision prediction.

- [c24] The method of claim 23, wherein pre-charging said brakes further comprises moving a friction component from a first position to a second position.
- [c25] The method of claim 23 further comprising moving said friction component from said second position to said first position if a brake pedal is not depressed a predetermined time after said threat of collision.
- [c26] The method of claim 23, wherein predicting said threat of collision further comprises sensing an operational parameter of the vehicle.
- [c27] The method of claim 23, wherein predicting said threat of collision further comprises sensing a current brake pressure.
- [c28] The method of claim 23 further comprising activating a vehicle warning device in response to said threat of collision.
- [c29] The method of claim 23, wherein pre-charging further comprises calculating an amount of pre-charging required to avoid a collision.
- [c30] The method of claim 23 further comprising engaging a

second stage pre-charge as a function of a high threat of collision and a signal indicating that a throttle pedal has been released.

- [c31] The method of claim 30 further comprising inhibiting said second stage pre-charge only if a failure with throttle actuation cannot be determined.
- [c32] The method of claim 30 further comprising halting said second stage pre-charge through throttle pedal activation.
- [c33] The method of claim 30 further comprising halting said second stage pre-charge in response to the vehicle near a limit of handling point regardless of an estimated threat.
- [c34] The method of claim 30 further comprising inhibiting said second stage pre-charge in response to failure of the vehicle braking system, a vehicle speed sensor or a proximity sensor.